



# Yorkshire Water

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Your ref:  
 Our ref:BA/PLEO/APH/16.04B

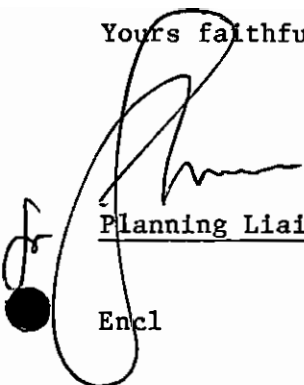
25th April 1986

Dear Sir

Horn Cragg Quarry, Silsden

I enclose a copy of a brief report which I have prepared for the proposal by A R Briggs & Co to reopen the above quarry as a source of bulk fill for the Aire Valley route construction. I have held initial discussions with the applicants and have sent them a copy of this report which covers broadly the subject matter of our discussions so far. They have promised to come back to us with proposals for dealing with potential problems and I shall keep you fully informed of progress.

Yours faithfully,

  
Planning Liaison & Estates Officer

Encl

SG 44 18

*Spoke to Andy Hinton -*

*Att. have been considered  
 - not been 2m done W.T.*

Mr A Hinton Ext 2388

For telephone enquiries on this matter please ask for .....

## HORN CRAG QUARRY - SILSDEN

### Proposal by A R Briggs & Co

To quarry 16 acres of existing quarry as shown on attached plan.  
Volume - 1.3 million tones of bulk fill for construction of Aire Valley route.  
Timescale - 2 years commencing July 1986  
Method of working - Quarry to a maximum base level of 225 metres, slightly benched across the site. Rock to be blasted and crushed on site to bulk fill (18" girth).

#### 1. Description of Quarry

Horn Crag Quarry (SE 052 479), near Silsden, is a recently reactivated quarry extracting sandstone blocks. It is situated on a hill with a steep slope to the west, and a gently dipping slope to the south.

Numerous small springs rise along a seepage front at the foot of the western escarpment, and some of these are used for private supplies. Unauthorised quarrying is thought to have caused pollution of these springs.

##### a) GEOLOGY

The quarry exploits a sandstone unit known locally as the Middleton Grit, a part of the Millstone Grit series. The Middleton Grit outcrops around Ilkley Moor and is believed to be in excess of 15 m thick. At Horn Crag it is a pale, fine to medium grained, well cemented sandstone, occurring in thick (up to 2 m) cross-bedded units with shale and thin flaggy sandstone partings. The general dip is easterly.

The Middleton Grit is sandwiched by shale beds. A lower shale unit is thrown up against the sandstone by a fault which trends north-south along the escarpment (Fig.1).

There are other minor faults in the area, but these have no significant effect on the structure.

##### b) HYDROGEOLOGY

Groundwater movement within the rock is almost certainly dominated by flow within joints and fissures. The degree of cementation of the sandstone is such as to make intergranular flow negligible. As a result of the cross bedding, together with effects of later faulting, there is likely to be good continuity between vertical and horizontal joints.

In the immediate vicinity of the quarry, particularly on the western side, groundwater flow is probably westwards, to the seepage front and springs which occur along the escarpment (Fig. 1). There will be little filtration or dilution of pollutants between the quarry and the springs.

On the eastern side of the quarry groundwater probably flows eastwards towards the boreholes in the Hang Goose area, one kilometre to the east.

## 2. POTENTIAL PROBLEMS

- i) Groundwater
  - possible pollution
  - reduction of aquifer storage and hence lower yields for private supplies
- ii) Surface Waters
  - possible pollution from surface run off
  - possible pollution from pumped groundwater from workings
- iii) Water Supply
  - effects on Lobwood aqueduct which runs close to western boundary of quarry.

These problems are dealt with in more detail below:-

### i) Groundwater

The impact of the proposals on groundwater resources is likely to be two-fold:-

#### a) Qualitative

During the quarrying operation there is a real danger of groundwater pollution. This would include fuel spillage, overflows from any septic tanks and the generation of fine siliceous material, particularly during blasting and crushing. Although the first two problems can be overcome, by sensible planning conditions, the last is likely to have a more serious effect on groundwater quality in the vicinity of the quarry.

#### b) Quantitative

The effect on actual resources will occur towards the end of the quarry's life, and subsequently, It appears that the proposal is to remove the entire thickness of the Middleton Grit over the 16 acre site. The Middleton Grit is an important local aquifer, and the quarry area accounts for up to 25% of the recharge area to several nearby abstractions.

If the excavation extends below the water table as it must if the entire aquifer thickness is removed, the effect on the local groundwater regime will be considerable. The removal of the unsaturated zone, and its associated storage, will result in lower spring flows and reduced groundwater levels in summer. Pollutants will have direct access to groundwater. The lagoon so created will act as a sump, reversing groundwater gradients and lowering groundwater levels in the vicinity. Ultimate restoration of the site will be difficult, with infill restricted to inert insoluble materials only.

The abstraction potentially at risk from this proposal, in order of decreasing risk, are as follows:-

1. Springs immediately to the west of Horn Crag supply a number of properties in the area. It is unlikely that the present quality and volume of spring flow would be sustained during and after quarrying. The applicants have indicated that they are willing to provide a private borehole to supply all existing users of this source. In theory, with the agreement of the affected parties, this would be an adequate provision. There are already at least three boreholes in the Cringles area, and a hydrogeological appraisal of these, coupled with pumping tests, would be required before consideration could be given to a licence application, but a brief investigation of our records suggests that adequate water should be available.
2. A spring 200 m due south of the quarry (SE 054 477, Exempt abstraction E69) supplies Crag House. The impact of the quarry on this spring is difficult to predict, but its proximity must place it at risk.
3. It is not certain where Sea Moor Farm (SE 058 479) obtains its water supply from. If it is a borehole it is likely to be into the Middleton Grit, and at 400 m due east of the quarry may be affected by reduced yield.
4. There are three licensed boreholes in the hang Goose area (SE 062 478). These may suffer reduced yield, particularly in the long term.
5. Yorkshire Water does not have comprehensive records of all abstractions. Private spring and borehole sources may exist locally, and it is recommended that a check be made. There is also likely to be a number of spring-fed field troughs in the vicinity.

ii) Surface Water

The local drainage system drains to the west to Fish Beck, which enters Silsden Reservoir within 800 m of the quarry. The reservoir is owned by Yorkshire Water, and although it is not now used for water supply purposes, it provides compensation water to the River Aire on a regular basis. Any pollution of the reservoir and feeder stream could not be permitted.

There are dangers of surface water pollution during quarrying operations resulting from fuel spillage and sewage pollution, but it is hoped that these can be dealt with by sensible planning conditions.

It is likely that there will be little surface water flowing from the site of the quarry itself as it should be relatively free draining although there will be from surrounding embankments. The applicant has offered to install 'a cut off drainage system to preclude the contamination of the natural drainage of the surrounding lands'. The details of this will have to be studied when the application is submitted but it must be capable of dealing with any fine material from the quarry. Any outfall from such a system to a watercourse will require a formal consent under the Control of Pollution Act 1974 which will place stringent restrictions on the quality.

The applicant proposes to quarry below the water table to a maximum level of approximately 8 metres. This will require considerable dewatering operations and a rough estimate suggests this may involve up to 5000 gallons/hour. This water is likely to be polluted with fine material and is unlikely to be suitable for discharging to surface water.

No proposals have been made by the applicant for dealing with the groundwater from any dewatering of the site.

### iii) Water Supply

Yorkshire Water apparatus affected by the development are shown on the attached plan. It involves two 900 mm diameter pumping mains and a telemetry cable and the line of the mains runs below the site and across the access road to the quarry.

The applicant has offered to construct a reinforced concrete raft across the line of the main to enable the passage of heavy vehicles. The raft would require supporting piers and would need to be designed and constructed to the satisfaction of Yorkshire Water.

The line of the aqueduct runs close to the quarry and there is some concern with regard to the effect of blasting operations and the resulting ground vibration on the structural integrity of the mains. It is not believed that there is a high risk but the Authority may seek indemnity from the quarry operators for mains failure and any resulting repair and damage liability.

### 3. CONCLUSIONS

There are many uncertainties but a high probable risk to local groundwater supplies associated with this application. The situation would be eased if quarrying were restricted to not deeper than 2 m above the maximum groundwater level. This would confine the main risk to the Horn Crag (Fishbeck Lane) Springs. Deeper excavation would require a detailed hydrogeological study of the area before its effect could be estimated, in particular the long term effects upon the springs/boreholes to the south and east of the quarry.

All of the comments in the report are made in the absence of any detailed proposals or drawings.

BH/PLEO/AH  
25.4.86

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